IN THE CLAIMS

Please amend the claims as indicated below:

1. (Currently Amended) A method for processing a signal ~~using a reduced complexity sequence estimation technique~~, said method comprising the steps of:

precomputing branch metrics for speculative sequences of one or more channel symbols;

selecting one of said precomputed branch metrics based on at least one decision from at least one corresponding state; and

selecting a path having a best path metric for a given state.

2. (Currently Amended) The method of claim 1, wherein said precomputed branch metrics is given by:

$$\tilde{\lambda}_n(z_n, a_n, \tilde{\alpha}) = (z_n - a_n + \tilde{u}(\tilde{\alpha}))^2 \cancel{.},$$

wherein an intersymbol interference estimate is obtained by evaluating the following equation:

$$\tilde{u}(\tilde{\alpha}) = -\sum_{i=1}^{L} f_i \tilde{a}_{n-i}$$

and wherein z_n is the detector input at time instant n, L is a channel memory length, $\{f_i\}$, $i \in [0,..,L]$ are coefficients of the equivalent discrete-time channel impulse response, a_n is a channel symbol, and $\tilde{\alpha} = (\tilde{a}_{n-L}, \ldots, \tilde{a}_{n-1})$ is a sequence of channel symbols.

3. (Original) The method of claim 1, wherein said path metric is an accumulation of said corresponding branch metrics over time.

4. (Currently Amended) The method of claim 1, wherein an appropriate branch metrics $\lambda_n(z_n, a_n, \rho_n)$ is selected from said precomputed branch metrics $\tilde{\lambda}_n(z_n, a_n, \tilde{\alpha})$ using the survivor path $\hat{\alpha}_n(\rho_n)$:

$$\lambda_n(z_n, a_n, \rho_n) = sel\{\Lambda_n(z_n, a_n, \rho_n), \hat{\alpha}_n(\rho_n)\} \cancel{.},$$

wherein $\Lambda_n(z_n, a_n, \rho_n)$ is a vector containing the branch metrics $\tilde{\lambda}_n(z_n, a_n, \tilde{\alpha})$, which can occur for a transition from state ρ_n and which correspond to channel symbol a_n, but different channel

sequences $\tilde{\alpha}$, and wherein $\hat{\alpha}_n(\rho_n)$ is the survivor sequence leading to state ρ_n.

5. (Original) The method of claim 1, wherein said best path metric is a minimum or maximum path metric.

6. (Currently Amended) The method of claim 1, wherein said processing of said signal is performed using ~~reduced complexity sequence estimation technique is~~ a reduced state sequence estimation technique.

7. (Currently Amended) The method according to claim ~~6~~1, wherein said ~~reduced state sequence estimation technique is~~processing of said signal is performed using a delayed decision-feedback sequence estimation technique.

8. (Currently Amended) The method according to claim ~~6~~1, wherein said ~~reduced state sequence estimation technique is~~ processing of said signal is performed using a parallel decision-feedback equalization technique.

9. (Currently Amended) The method of claim 1, wherein said ~~reduced complexity sequence estimation technique is~~ processing of said signal is performed using an implementation of the Viterbi algorithm.

10. (Currently Amended) The method of claim 1, wherein said ~~reduced complexity sequence estimation technique is~~ processing of said signal is performed using an implementation of the M algorithm.

11. (Previously Amended) The method of claim 1, wherein said decisions from a corresponding state is a survivor symbol.

12. (Previously Amended) The method of claim 1, wherein said decision from a corresponding state is an add-compare-select decision.

13. (Currently Amended) A method for processing a multi-dimensional signal ~~using a reduced complexity sequence estimation technique~~, said method comprising the steps of:

precomputing one-dimensional branch metrics for each dimension of the multi-dimensional signal for speculative sequences of one or more channel symbols;

selecting one of said precomputed one-dimensional branch metric based on at least one decision from at least one corresponding state; and

combining said selected one-dimensional branch metrics to obtain a multi-dimensional branch metric.

14. (Previously Amended) The method of claim 13, wherein said one-dimensional branch metric in the dimension j is precomputed by evaluating the following expressions:

$$\tilde{\lambda}_{n,j}(z_{n,j}, a_{n,j}, \tilde{\alpha}_j) = (z_{n,j} - a_{n,j} + \tilde{u}_j(\tilde{\alpha}_j))^2 \text{ and } \tilde{u}_j(\tilde{\alpha}_j) = -\sum_{i=1}^{L} f_{i,j}\tilde{a}_{n-i,j} \text{ ,}$$

wherein $z_{n,j}$ is the detector input, $a_{n,j}$ is channel symbol at time n and $\tilde{\alpha}_j = (\tilde{a}_{n-L,j}, ..., \tilde{a}_{n-1,j})$ is a sequence of channel symbols in dimension j, L is a channel memory length, B is the number of dimensions, and $\{f_{i,j}\}$, $i \in [0,..,L]$, $j \in [1..,B]$ are coefficients of the equivalent discrete-time channel impulse response.

15. (Currently Amended) The method of claim 13, wherein said selection of an appropriate one-dimensional branch metrics ~~for further processing with a reduced complexity sequence estimator~~is given by:

$$\lambda_{n,j}(z_{n,j}, a_{n,j}, \rho_n) = sel\{\Lambda_{n,j}(z_{n,j}, a_{n,j}), \hat{\alpha}_{n,j}(\rho_n)\},$$

wherein $\Lambda_{n,j}(z_{n,j}, a_{n,j})$ is the vector containing possible one-dimensional branch metrics $\tilde{\lambda}_{n,j}(z_{n,j}, a_{n,j}, \tilde{\alpha}_j)$ for the same channel symbol $a_{n,j}$, but different channel symbol sequences $\tilde{\alpha}_j$ and $\hat{\alpha}_{n,j}(\rho_n)$ is the survivor sequence in dimension j leading to state ρ_n.

16. (Previously Amended) The method of claim 13, wherein said decision from a corresponding state is a survivor symbol.

17. (Previously Amended) The method of claim 13, wherein said decision from a corresponding state is an add-compare-select decision.

18. (Currently Amended) A method for processing a multi-dimensional signal ~~using a reduced complexity sequence estimation technique~~, said method comprising the steps of:

precomputing one-dimensional branch metrics for each dimension of the multi-dimensional signal <u>for speculative sequences of one or more channel symbols</u>;

combining said one-dimensional branch metrics into at least two-dimensional branch metrics; and

selecting one of said at least two-dimensional branch metrics based on at least one decision from at least one corresponding state.

19. (Previously Amended) The method of claim 18, wherein said one-dimensional branch metric in the dimension j is precomputed by evaluating the following expressions:

$$\tilde{\lambda}_{n,j}\left(z_{n,j}, a_{n,j}, \tilde{\alpha}_j\right) = \left(z_{n,j} - a_{n,j} + \tilde{u}_j\left(\tilde{\alpha}_j\right)\right)^2 \text{ and } \tilde{u}_j\left(\tilde{\alpha}_j\right) = -\sum_{i=1}^{L} f_{i,j}\tilde{a}_{n-i,j},$$

wherein $z_{n,j}$ is the detector input, $a_{n,j}$ is channel symbol at time n and $\tilde{\alpha}_j = \left(\tilde{a}_{n-L,j},..,\tilde{a}_{n-1,j}\right)$ is a sequence of channel symbols in dimension j, L is a channel memory length, B is the number of dimensions, and $\{f_{i,j}\}$, $i \in [0,..,L]$, $j \in [1..,B]$ are coefficients of the equivalent discrete-time channel impulse response.

20. (Currently Amended)The method of claim 18, wherein said selection of an appropriate at least two-dimensional branch metrics corresponding to a particular state and channel symbol ~~for further processing with a reduced complexity sequence estimator~~is based on the survivor symbols for said state and said at least two dimensions and said selection is performed among said precomputed at least two-dimensional branch metrics for said state, channel symbol and different previous channel symbol sequences.

21. (Previously Amended) The method of claim 18, wherein said decision from a corresponding state is a survivor symbol.

22. (Previously Amended) The method of claim 18, wherein said decision from a corresponding state is an add-compare-select decision.

23. (Original) The method of claim 18, further comprising the step of combining said selected at least two-dimensional branch metric to obtain a multi-dimensional branch metric.

24. (Currently Amended) A method for processing a signal received from a channel ~~using a reduced complexity sequence estimation technique~~, said method comprising the steps of:

prefiltering said signal to shorten a memory of said channel;

precomputing branch metrics for ~~possible values of~~ <u>speculative sequences of symbols that correspond to</u> said shortened channel memory;

selecting one of said precomputed branch metrics based on at least one decision from at least one corresponding state; and

selecting a path having a best path metric for a given state.

C1 Cont.

25. (Original) The method of claim 24, wherein said prefiltering step further comprises the step of processing less significant taps with a lower complexity cancellation algorithm that cancels the less significant taps using tentative decisions and processing more significant taps with a reduced state sequence estimation technique.

26. (Previously Amended) The method according to claim 25, wherein said lower complexity cancellation algorithm is a decision feedback prefilter technique.

27. (Previously Amended) The method according to claim 25, wherein said lower complexity cancellation algorithm utilizes a linear equalizer technique.

28. (Previously Amended) The method according to claim 25, wherein said lower complexity cancellation algorithm is a soft decision feedback prefilter technique.

29. (Previously Amended) The method according to claim 25, wherein said lower complexity cancellation algorithm reduces the intersymbol interference associated with said less significant taps.

30. (Previously Amended) The method according to claim 25, wherein said more significant taps comprise taps below a tap number, U, where U is a prescribed number less than L.

31. (Currently Amended) The method according to claim 24, wherein said processing of said signal is performed using ~~reduced complexity sequence estimation technique is~~ a delayed decision-feedback sequence estimation technique.

32. (Currently Amended) The method according to claim 24, wherein said processing of said signal is performed using ~~reduced complexity sequence estimation technique is reduced complexity sequence estimation technique is~~ a parallel decision-feedback equalization technique.

33. (Currently Amended) The method according to claim 24, wherein said processing of said signal is performed using ~~reduced complexity sequence estimation technique is~~ a reduced state sequence estimation technique.

34. (Currently Amended) The method according to claim 24, wherein said processing of said signal is performed using ~~reduced complexity sequence estimator is~~ an implementation of the Viterbi algorithm.

35. (Currently Amended) The method according to claim 24, wherein said processing of said signal is performed using ~~reduced complexity sequence estimation technique is~~ an implementation of the M algorithm.

36. (Previously Amended) The method of claim 24, wherein said decision from a corresponding state is a survivor symbol.

37. (Previously Amended) The method of claim 24, wherein said decision from a corresponding state is an add-compare-select decision.

38. (Currently Amended) A method for processing a signal received from a channel ~~using a reduced complexity sequence estimation technique~~, said method comprising the steps of:

prefiltering said signal to shorten a ~~channel~~ memory of said channel;

precomputing a one-dimensional branch metric for ~~possible values of~~ speculative sequences of channel symbols for said shortened channel memory and for each dimension of the multi-dimensional signal;

combining said one-dimensional branch metric into at least two-dimensional branch metrics; and

selecting one of said at least two-dimensional branch metrics based on at least one decision from at least one corresponding state.

39. (Cancelled)

40. (Cancelled)

41. (Cancelled)

42. (Cancelled)

43. (Cancelled)

44. (Cancelled)

45. (Cancelled)

46. (Cancelled)

47. (Currently Amended) A ~~reduced complexity sequence estimator~~ signal processor for processing a signal, comprising:

a branch metrics unit for precomputing branch metrics for speculative sequences of

one or more channel symbols;

a multiplexer for selecting one of said precomputed branch metrics based on at least one decision from at least one corresponding state; and

an add-compare-select unit for selecting a path having a best path metric for a given state.

48. (Currently Amended) The ~~reduced complexity sequence estimator~~ signal processor of claim 47, wherein said decision from a corresponding state is taken from the survivor memory unit.

C1 Cont.

49. (Currently Amended) The ~~reduced complexity sequence estimator~~ signal processor of claim 47, wherein said decision from a corresponding state is taken from the add-compare-select unit.

50. (Currently Amended) A ~~reduced complexity sequence estimator~~ signal processor for processing a multi-dimensional signal:

a branch metrics unit for precomputing one-dimensional branch metrics for each dimension of the multi-dimensional trellis code for speculative sequences of one or more channel symbols;

a multiplexer for selecting one of said precomputed one-dimensional branch metric based on at least one decision from at least one corresponding state; and

a multi-dimensional branch metric computation unit for computing a multi-dimensional branch metric based on said selected one-dimensional branch metrics.

51. (Currently Amended) The ~~reduced complexity sequence estimator~~ signal processor of claim 50, wherein said decision from a corresponding state is available in the survivor memory unit.

52. (Currently Amended) The ~~reduced complexity sequence estimator~~ signal processor of claim 50, wherein said decision from a corresponding state is available in the add-compare-select unit.

53. (Currently Amended) A ~~reduced complexity sequence estimator~~ signal processor for processing a multi-dimensional signal, comprising:

a branch metrics unit for precomputing one-dimensional branch metrics for each dimension of the multi-dimensional signal for speculative sequences of one or more channel symbols;

means for combining said one-dimensional branch metric into at least two-dimensional branch metrics;

a multiplexer for selecting one of said at least two-dimensional branch metrics based on at least one decision from at least one corresponding state; and

a multi-dimensional branch metric unit for combining said selected at least two-dimensional branch metric to obtain a multi-dimensional branch metric.

54. (Currently Amended) The ~~reduced complexity sequence estimator~~ signal processor of claim 53, wherein said decision from a corresponding state is based on a survivor symbol in a corresponding survivor path cell.

55. (Currently Amended) The ~~reduced complexity sequence estimator~~ signal processor of claim 53, wherein said decision from a corresponding state is based on a decision from a corresponding add-compare-select cell.

56. (Currently Amended) A ~~reduced complexity sequence estimator~~ signal processor for processing a signal received from a channel, comprising:

a prefilter to shorten a ~~channel~~ memory of said channel;

a branch metrics unit for precomputing branch metrics for ~~possible values of~~ speculative sequences of one or more channel symbols for said shortened channel memory;

a multiplexer for selecting one of said precomputed branch metrics based on at least one decision from at least one corresponding state; and

an add-compare-select unit for selecting a path having a best path metric for a given state.

57. (Currently Amended) The ~~reduced complexity sequence estimator~~ signal processor of claim 56, wherein said decision from a corresponding state is based on a survivor symbol in the survivor memory unit.

58. (Currently Amended) The ~~reduced complexity sequence estimator~~ signal processor of claim 56, wherein said decision from a corresponding state is based on an add-compare-select decision.

C1 cont.

59. (Currently Amended) A ~~reduced complexity sequence estimator~~ signal processor for processing a multi-dimensional signal received from channel ~~having a channel memory~~, comprising:

a prefilter to shorten a ~~channel~~ memory of said channel;

a branch metrics unit for precomputing one-dimensional branch metrics for ~~possible values of~~ speculative sequences of one or more channel symbols for said shortened channel memory and for each dimension of the multi-dimensional signal;

means for combining said one-dimensional branch metric into at least two-dimensional branch metrics; and

a multiplexer for selecting one of said at least two-dimensional branch metrics based on at least one decision from at least one corresponding state.